

NOTES ON THE APPLICATION OF UPPER-AIR OBSERVATIONS TO WEATHER FORECASTING.

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The two features of the free-air observations above Mount Weather during March, 1912, which call for comment are, first, the strength of the upper winds, and, second, the large number of barometric depressions which passed over the station during the month. High winds, that is, winds of more than 50 miles per hour (22.3 meters per second), were encountered on 16 days, the highest velocity being 76 miles per hour (34 meters per second) from the west-northwest on the 22d at an altitude of 3,262 meters (10,702 feet). This high velocity occurred in the southeastern quadrant of a barometric maximum, whose center overlaid the middle Mississippi Valley. On the day previous a pronounced barometric minimum had passed over Mount Weather, but it was possible to make only a short flight into it by reason of the violence of the winds aloft. In making the flight the first stop was at an altitude of 370 meters (1,213 feet) above the mountain. Here the wind was blowing from the west at a speed of 60 miles per hour (26.8 meters per second). At the next and last level at which readings were obtained, viz, at 769 meters (2,522 feet), above the mountain the velocity had increased to 74 miles per hour (33 meters per second) and the direction was west-southwest, thus showing that the cyclonic gyrations persisted at that level although the barometer at the surface had been rising for several hours. It is a curious fact that although this barometric depression was over the station for more than 12 hours there was not enough movement in the air to keep the kites from falling to the ground from the few meters of altitude that the local winds carried them, yet when finally the kites were raised above the surface winds they encountered strong gales which probably had been blowing all day long. The conditions thus described are those which obtain just after the passage eastward of the center of a barometric minimum, the "eye" of the storm

as it is sometimes called. The high winds a short distance above the mountain became apparent on the surface 6 or 8 hours later as a moderate gale, only, diminishing to brisk winds on the afternoon of the following day.

On the 26th the kites encountered at an altitude of 3,750 meters (12,303 feet) west-northwest winds of 73 miles per hour (32.6 meters per second). Neither the direction nor the velocity of these winds was in accord with the surface isobars. The latter indicated southerly or southwesterly winds aloft. On the following day a wind of practically the same velocity was met at an altitude of only 1,969 meters; above that level, however, the winds diminished rapidly. These high winds aloft from whatever cause they arose were not propagated downward to the earth's surface and their mention here serves no other purpose than to direct attention to the occurrence of strong winds above, which do not easily find an explanation in the surface pressure distribution.

The great majority of the high winds observed are from a westerly quarter, with a considerable northerly component. High-surface pressure is generally on their right and low pressure on their left hand side. When such is the case the temperature aloft is low in proportion as the crest of the high-pressure area is near at hand or far removed from Mount Weather. As the crest of the high pressure passes to the eastward of Mount Weather the upper winds acquire a southerly component and the temperature rises.

While a large number of barometric depressions passed over Mount Weather during the month, a careful study of the upper air data on the day previous to the advent of each depression does not show, as yet, that decided changes are in progress whereby the course or intensity of the depression might be inferred.